CLAIMS

1. A semiconductor device comprising:

a first semiconductor region (15) of a first conductive type;

a second semiconductor region (21) of a second conductive type formed on said first semiconductor region (15);

a third semiconductor region (13) of the first conductive type formed in a surface region of said second semiconductor region (21) along an outer periphery of said second semiconductor region (21), and having a higher impurity concentration than that of said first semiconductor region (15);

a fourth semiconductor region (14) of the first conductive type formed adjacent to a bottom surface of said third semiconductor region (13), and having a higher impurity concentration than that of said first semiconductor region (15);

a fifth semiconductor region (19) of the first conductive type formed in the surface region of said second semiconductor region (21);

a sixth semiconductor region (23) of the second conductive type formed in a surface region of said fifth semiconductor region (19);

a first electrode (2) electrically connected to said second semiconductor region (21);

a second electrode (4) electrically connected to said sixth semiconductor region (23); and

a control electrode (3) laid out on said fifth semiconductor region (19) through an insulating film (31),

wherein said fourth semiconductor region (14) is formed in said first semiconductor region (15) and said second semiconductor region (21), and is so formed as to extend closer to said fifth semiconductor region (19) than said third semiconductor region (13).

2. The semiconductor device according to claim 1, wherein said fourth

semiconductor region (14) is formed in such a way that an electric potential difference between said control electrode (3) and said fifth semiconductor region (19) lying under said control electrode (3) becomes small with negative static electricity being applied to said first electrode (2).

3. The semiconductor device according to claim 1, wherein said fourth semiconductor region (14) faces said fifth semiconductor region (19) through said second semiconductor region (21).

4. The semiconductor device according to claim 1, wherein said fourth semiconductor region (14) is so formed as to extend closer to said first electrode (2) than said fifth semiconductor region (19).

5. The semiconductor device according to claim 1, further comprising a seventh semiconductor region (22) of the second conductive type having a higher impurity concentration than that of said second semiconductor region (21), in the surface region of said second semiconductor region (21),

wherein said seventh semiconductor region (22) is electrically connected to said first electrode (2).

6. The semiconductor device according to claim 5, wherein said fifth semiconductor region (19) is formed in a closed ring shape so as to surround said seventh semiconductor region (22), and

said third semiconductor region (13) is formed in a closed ring shape so as to surround said fifth semiconductor region (19).

7. The semiconductor device according to claim 1, further comprising an eighth semiconductor region (12) of the first conductive type formed in the surface region of said fifth semiconductor region (19) and having a higher impurity concentration than that of said fifth semiconductor region (19),

wherein said eighth semiconductor region (12) is electrically connected to a back

gate electrode (5).

8. A semiconductor device comprising:

a first semiconductor region (15) of a first conductive type;

a second semiconductor region (21) of a second conductive type formed on said first semiconductor region (15);

a third semiconductor region (13) of the first conductive type formed in a surface region of said second semiconductor region (21) along an outer periphery of said second semiconductor region (21), and having a higher impurity concentration than that of said first semiconductor region (15);

a fourth semiconductor region (14) of the first conductive type formed adjacent to a bottom surface of said third semiconductor region (13), and having a higher impurity concentration than that of said first semiconductor region (15);

a fifth semiconductor region (19) of the first conductive type formed in the surface region of said second semiconductor region (21);

a sixth semiconductor region (23) of the second conductive type formed in a surface region of said fifth semiconductor region (19);

a first electrode (2) electrically connected to said second semiconductor region (21);

a second electrode (4) electrically connected to said sixth semiconductor region (23); and

a control electrode (3) laid out on said fifth semiconductor region (19) through an insulating film (31),

wherein said fourth semiconductor region (14) is formed in said first semiconductor region (15) and said second semiconductor region (21), and has a protrusive piece (14a) so formed as to extend closer to said first electrode (2) side than said third semiconductor region (13), and a portion (14b) so formed as not to extend closer to said first electrode (2) than said protrusive piece (14a).

9. The semiconductor device according to claim 8, wherein the protrusive piece (14a) of said fourth semiconductor region (14) is formed in such a way that an electric potential difference between said control electrode (3) and said fifth semiconductor region (19) lying under said control electrode (3) becomes small with negative static electricity being applied to said first electrode (2).

10. The semiconductor device according to claim 8, wherein a top surface of the protrusive piece (14a) of said fourth semiconductor region (14) faces a bottom surface of said fifth semiconductor region (19) through said second semiconductor region (21).

11. The semiconductor device according to claim 8, further comprising a seventh semiconductor region (22) of the second conductive type having a higher impurity concentration than that of said second semiconductor region (21), in the surface region of said second semiconductor region (21),

wherein said seventh semiconductor region (22) is electrically connected to said first electrode (2).

12. The semiconductor device according to claim 8, further comprising an eighth semiconductor region (12) of the first conductive type formed in the surface region of said fifth semiconductor region (19) and having a higher impurity concentration than that of the fifth semiconductor region (19),

wherein said eighth semiconductor region (12) is electrically connected to a back gate electrode (5).

13. The semiconductor device according to claim 12, wherein said fifth semiconductor region (19) has regions (19b) including said sixth semiconductor region (23) and said eighth semiconductor region (12), and regions (19a) not including said sixth semiconductor region (23) and said eighth semiconductor region (12), and both regions are formed as to be alternately and apart from each other.

14. The semiconductor device according to claim 13, wherein the protrusive piece

(14a) of said fourth semiconductor region (14) is formed beneath said region (19a) of said fifth semiconductor region (19) not including said sixth semiconductor region (23) and said eighth semiconductor region (12).

15. The semiconductor device according to claim 14, wherein the protrusive piece (14a) of said fourth semiconductor region (14) is so formed as to extend closer to said first electrode (2) than said fifth semiconductor region (19).

16. The semiconductor device according to claim 13, wherein the protrusive piece (14a) of said fourth semiconductor region (14) is not formed beneath said region (19b) of said fifth semiconductor region (19) including said sixth semiconductor region (23) and said eighth semiconductor region (12).

17. The semiconductor device according to claim 13, wherein the regions (19b) of said fifth semiconductor region (19), which include said sixth semiconductor region (23) and said eighth region (12), and the regions (19a) of said fifth semiconductor region (19) which do not include said sixth semiconductor region (23) and said eighth semiconductor region (12) are laid out in said fifth semiconductor region (19) alternately and apart from each other so as to surround said seventh semiconductor region (22), and

said third semiconductor region (13) is formed in a closed ring shape so as to surround said fifth semiconductor region (19).

18. The semiconductor device according to claim 8, further comprising a high-voltage resistive element (121).